Name ....

Index Number ..../......................

Candidate's Signature ....

Date ....

121/1
MATHEMATICS (Alt. 1)

Time: $2^1/_2$ hours
Paper 1
July/ August 2013

KIKUYU DISTRICT INTERSCHOOLS EVALUATION

KENYA CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS (Alt. 1)
Paper 1
Time: $2^1/_2$ hours
July/ August 2013

Instructions to candidates

(a) Write your Name and Index number in the spaces provided above.
(b) Sign and write the date of examination in the spaces provided above.
(c) This paper consists of **TWO** sections: **Section I** & **Section II.**
(d) Answer **ALL** the questions in **Section I** and only **five** questions from **Section II**.
(e) All answers and working **must be** written on the question paper in the spaces provided below each question.
(f) **Show all the steps in your calculations, giving your answer at each stage in the spaces below each question.**
(g) Marks may be given for correct working even if the answer is wrong.
(h) **Non-programmable** silent electronic calculators **and** KNEC mathematical tables **may be** used except where stated otherwise.
(i) This paper consists of 16 printed pages.
(j) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

For Examiner's use only

Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

Section II

17	18	19	20	21	22	23	24	TOTAL

Grand Total	

SECTION 1 (50 MARKS)

Answer all the questions in the spaces provided

1. Without using a calculator evaluate (3marks)

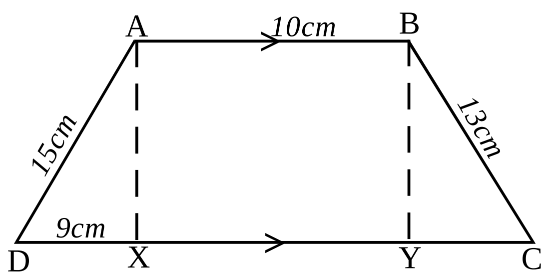
$$\frac{3\frac{2}{3}\ of\ 21 + 3\frac{3}{4} \div \frac{3}{8} - 4\frac{1}{2} \times 3\frac{1}{3}}{5\frac{5}{8} \times 1\frac{7}{9} - \frac{5}{4} of\ 4\frac{4}{5} + 2\frac{4}{5} \div \frac{7}{10}}$$

2. Find two consecutive even numbers such that seven times the smaller is 4 less than 6 times the greater. (3marks)

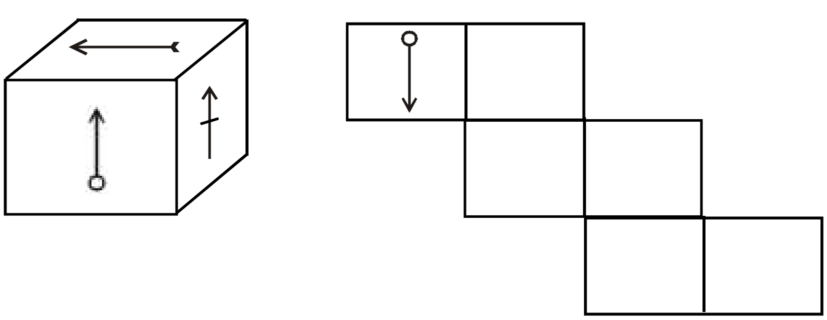
3. Solve for x; $25^{x+1} - 5^{2x+1} = 2500$ 4.(3marks)

4. A seven sided polygon has two of its interior angles 140^0 and 160^0; and the remaining angles are equal. Find the size of one of the equal angles. (3marks)

5. In the figure below AB is parallel to DC. The lines AX and BY are perpendicular to DC. Given that AD = 15cm, AB = 10cm, DX = 9cm and BC = 13cm, calculate the area of trapezium ABCD. (3marks)



6. The diagram below represents a cube with faces marked as shown. Each of the opposite face to that shown on the diagram is marked with the same sign but in the reverse direction to that shown on the diagram of the cube. On the net of the diagram only one face has been identified with its sign. Identify each of the remaining faces with the correct sign. (3 marks)



7. A gear which is having 60 teeth drives another which has 64 teeth. Find how many times each wheel must rotate before the two teeth which are together one on each wheel will be together again in one position. (3marks)

8. Simplify $\dfrac{a^2 - a + \frac{1}{4}}{a^2 - \frac{1}{4}}$ (3marks)

9. P(3, 2) and Q(6, 5) are two vertices of a square PQRS such that R and S have positive co-ordinates. Determine the coordinates of R and S. (3marks)

10. A trader marked a shirt at Sh. 1400. He sold the shirt to a customer after allowing him a discount of 10% . If the trader made a profit of 25%, determine how much he had paid for the shirt. (3marks)

11. A sum of money is divided among three girls A, B and C in the ratio 18:16:11. If A got Sh. 1841 more than C, how much did each get? (3marks)

12. If $\tan \alpha = {}^{8}/_{15}$, without using tables or calculator, find; (3marks)

$$\frac{\sin \alpha - \cos \alpha}{\cos \alpha + \sin \alpha}$$

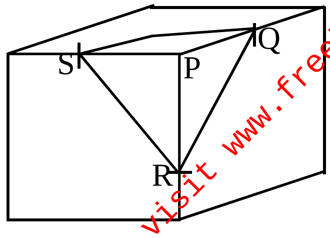
13. The line segment joining T(-5, 0) and S(15, 4) is perpendicular to the line joining P(4, 7) and Q(8, y).

(i) Find the value of y (2marks)

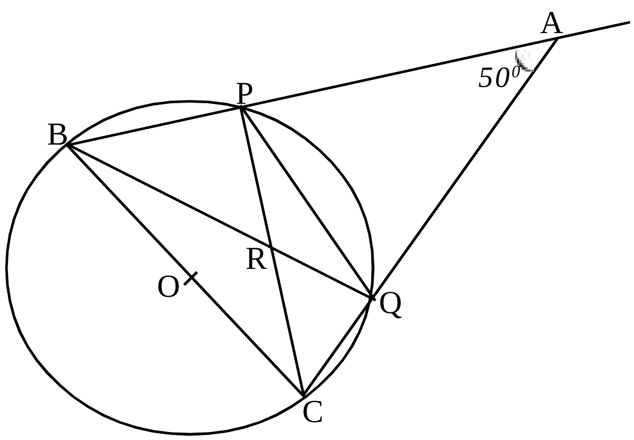
(ii) Find the coordinates of the point of intersection of the line segments. (2marks)

14. The mean of n numbers is 15. If the same numbers together with 20 have a mean of 16, find the value of n. (3marks)

15. A triangular pyramind PQRS is cut from the corner of a cube of side 20cm. Given that PQ = PR = PS = 12cm, find the volume of the remaining solid. (3marks)



16. In the figure below BOC is the diameter and angle BAC = 50^0



Calculate

(a) angle BRC (2marks)

(b) angle PBQ (2marks)

SECTION II (50 MARKS)

Answer only FIVE questions in this section in the spaces provided

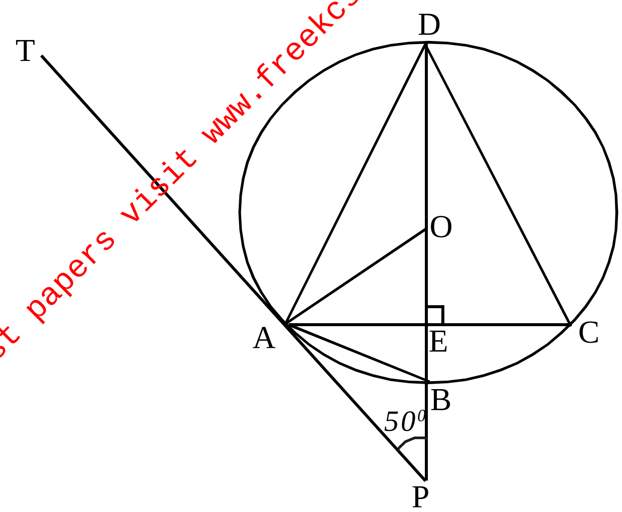
17. The inside of a rectangular hall measures 15m long, 9m wide and 3m high. There are three doors each measuring 2m by 2.2m and six windows each measuring 1.5m by 1.5m. The walls of the hall are to be painted.

(a) Calculate the total area of the walls to be painted. (4marks)

(b) To paint an area of $2.5m^2$ requires one litre of paint. If the paint is sold in 4 litres determine the number of tins of paint that should be bought. (3marks)

(c) The cost of a 4 litre tin of paint is Ksh. 1700. The painter is paid a fixed charge of Ksh. 2000 and Ksh. 30 per square metre of the wall painted. Calculate the total cost of painting the walls. (3marks)

18. In the figure below, O is the centre of the circle of radius 2.5cm DOBP is a straight line and is perpendicular to the chord AC at E. Line TP is tangent to the circle at A and angle APD = 50^0.



(a) Calculate, to 2 decimal places the length of;

(i) OP; (2marks)

(ii) AP (2marks)

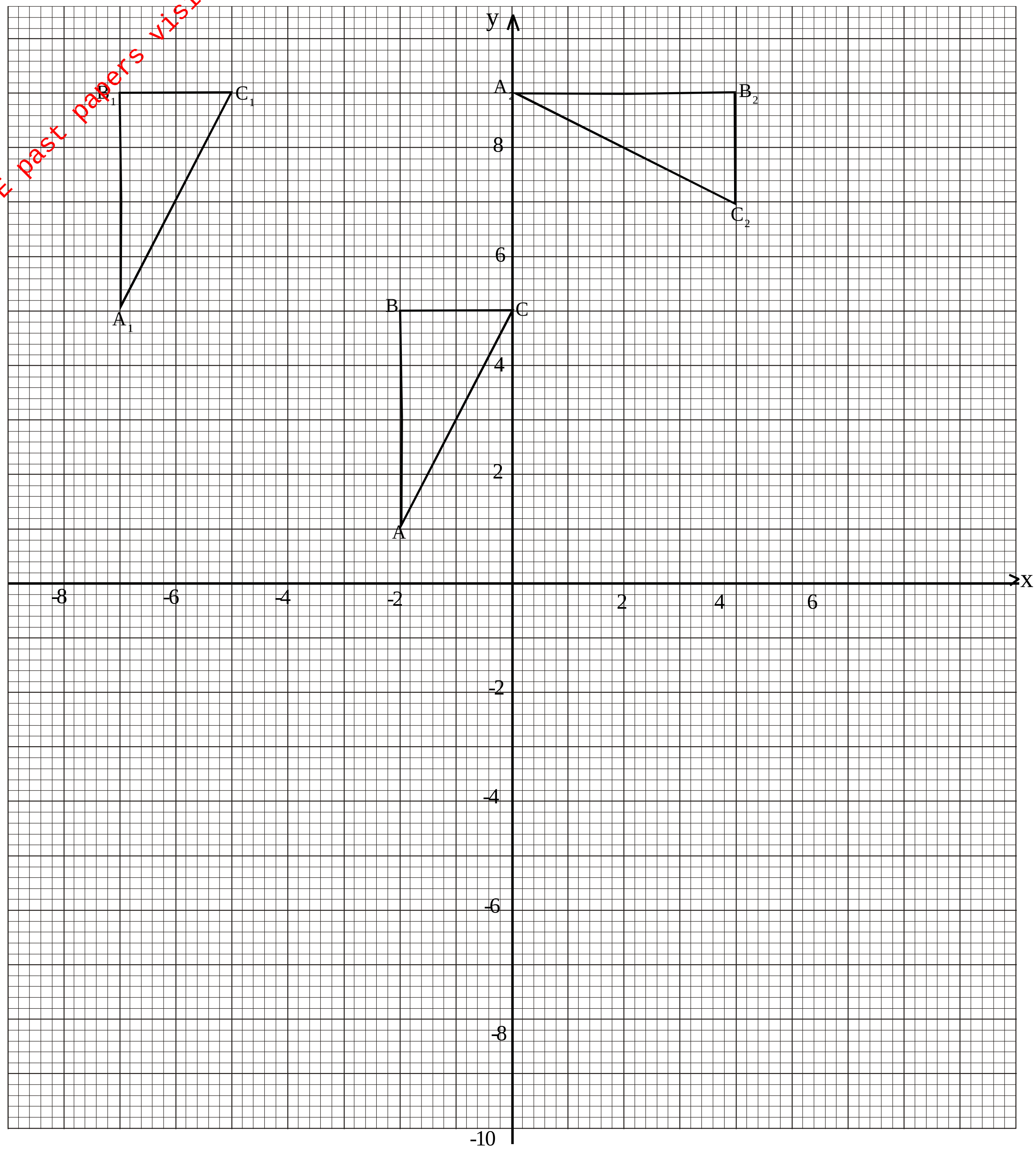
(iii) AC (2marks)

(b) Determine the size of;

(i) angle ADC (2marks)

(ii) angle ACD (2marks)

19.



(a) $A_1B_1C_1$ is the image of triangle ABC under translation T. Find T. (1mark)

(b) $A_2B_2C_2$ is the image of ABC under a negative rotation. Find the angle and centre of this rotation. (4marks)

(c) The triangle $A_3B_3C_3$ with coordinates $A_3(2, -3)$, $B_3(6, -3)$ and $C_3(6, -1)$ is the image of ABC under a reflection in the line L. Draw line L and find the equation of line L. (3marks)

(d) Enlarge triangle ABC by scale factor (-2) and and centre of enlargement (-2, 0). State the coordinates of the image $A_4B_4C_4$. (2marks)

20. ABCD is a parallelogram with $\underset{\sim}{CB}\begin{pmatrix}-6\\6\end{pmatrix}$, $\underset{\sim}{CD}=\begin{pmatrix}5\\10\end{pmatrix}$ and point C is (-5, 2).

Determine;

(a) the coordinates of

(i) B (2marks)

(ii) D (2marks)

(iii) A (2marks)

(b) the length of the diagonal AC (2marks)

(c) The point of intersection of the diagonals AC and BD (2marks)

21. Complete the table below for the equation
$y = 2x^2 + 4$

(a)

X	-1	-0.75	-0.5	-0.25	0	0.25	0.5	0.75	1	1.25	1.5	1.75	2
Y	6		4.5		4		4.5		6		8.5		12

(2marks)

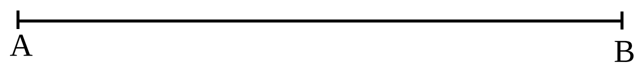
(b) Use the completed table and the mid-ordinate rule with 6 strips to estimate the area bounded by the curve $y = 2x^2 + 4$, the x-axis and the lines $x = -1$ and $x = 2$. (3marks)

(c) By intergrating the given function find the exact area in (b) above. (3marks)

(d) Hence calculate to 2 decimal places the percentage error in the area estimated by the mid-ordinate rule. (2marks)

22. Line AB shown below is one side of a triangle ABC in which AC = 7cm, and angle BAC $= 120^0$. Using a pair of compasses and ruler only.

(a) Complete triangle ABC (2marks)



(b) On the same diagram as in (a) above

(i) construct a circle that touches the sides of triangle ABC. Measure the radius of the circle. (3marks)

(ii) construct a perpendicular from C to meet BA produced at N. Measure the length of CN. (2marks)

(c) Find the area of the region in the triangle ABC that lies outside the circle. (3marks)

23. Two farmers Peter and James took a total of 40 beef cattles for sale at two different slaughter houses and each got the same amount from the sale. If Peter had sold at James selling price he would have got Sh. 115,200 and if James had sold at Peter's selling price he would have got Sh. 51,200.

(a) How many beef cattle did each take to the slaughter house? (6marks)

(b) What was the buying price at the two slaughter houses? (2marks)

(c) If 6 of Peter's cow died, find the percentage increase per cow he needed to make in order to realise the same amount from the sale of the remaining cows. (2marks)

24. A closed cylinder has base radius r cm and height h cm. The total surface area is $100cm^2$.

(a) Show that $h = \frac{50}{\pi r} - r$ (3marks)

(b) Show that the volume Vcm^3 is given by
$V = 50r - \pi r^3$ (2marks)

(c) Find the value of r which gives maximum value of v (3marks)

(d) Find the maximum volume of the cylinder. (2marks)
(Take $\pi = 3.142$)